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Quick-Change Attachment

The invention relates to a quick-change attachment to connect a tool, preferably to the boom of a hydraulic excavator, comprising a boom-connecting quick-change component to accommodate a tool, one end of which has a pin, and the other end of which is retained in a bearing of the quick-change attachment by positive-fit or friction engagement.

Quick-change attachments of the above type are widely used on hydraulic excavators and other construction machinery since they provide for the simple and rapid exchange of various tools such as hydraulic grabs, digging-excavating buckets, grapplers, or the like.

This species of quick-change attachments, which are used principally on construction sites, are constantly exposed to dirt and other hard loads – with the result that the bearings, principally the semi-enclosed portions of the quick-change attachment, are subject to significant wear. In order to ensure the full functionality of quick-change attachment systems, the bearing must be regenerated after a certain level of bearing play has been reached. This regeneration is usually accomplished by welding-based

hard-facing of the region of the bearing, and by re-boring the bearing in a horizontal boring machine. The result is an extended out-of-service period and considerable expense since this work is performed only by special shops.

The goal of the invention is therefore to modify a quick-change attachment of the species so as, first of all, to extend the tool life of the quick-change attachment, and secondly, to enable the quick-change attachment to be regenerated in a simple and cost-effective manner.

This goal is achieved according to the invention by the combination of features provided in Claim 1. To this end, a bushing implemented in the form of a half-liner with a large support angle (α) is inserted in the bearing. The bushing is designed in such a way that it has a large circumferential support angle along with a correspondingly thick wall, thereby ensuring that the bushing is securely seated within its support area. The special advantage of the bushing is that it is a replaceable element which is easy to remove and replace within a short time period on the construction site.

Special embodiments of the invention are presented in the dependent claims following the main claim.

The bushing may thus be composed of a wear-resistant material. In other words, the material quality of the bushing may be enhanced by selecting an especially wear-resistant material, or by treating the bushing using a suitable method for enhancing the quality of the material, for example, hardening or another wear-reducing method. The result is that the tool life of the bushing is increased by a factor of 2 to 3 times, while the overall service time of the quick-change attachment until the next regeneration is required is correspondingly extended.

In another advantageous embodiment of the invention, the bushing may be secured within a bushing support region of the bearing using an adhesive-bonding joint, shrink joint, welded joint, and/or screw connection.

In an especially advantageous embodiment of the invention, the bushing may be implemented with an external collar which specifically enhances the edge region in terms of strength and inherent stability. As a result, the edge pressure encountered may be accommodated without any significant deformation by the bushing. An additional advantageous aspect related to the bushing's inherent stability is the fact that the bushing is seated more firmly within corresponding bore hole provided within the bushing support region of the bearing.

The bushing in the form of a half-liner advantageously has an insertion slot which has essentially the same diameter as the bearing hole. As a result, a surface is created which still ensures good support within the high-strength bushing material present despite significant wear and displacement of the center-point of the tool-connecting pin.

Finally, the bushing may be composed of a curved, flat steel, whereby the faces of the bushing's free ends make contact within the bushing support region of the bearing. As a result, the bushing is optimally seated within the bushing support region of the bearing, and any radial displacement of the bearing within this bushing support region is effectively prevented.

Additional features, details and advantages of the invention are presented based on an embodiment illustrated in the drawing.

Figure 1: is a perspective view of a boom-connnecting quick-change attachment,

Figure 2 shows an enlarged section through the quick-change attachment according to Fig. 1 and Fig. 3a and 3b illustrate according to a segment of Fig. 1 illustrate different bushing designs [sic].

The quick-change attachment component 10 shown in Figure 1 is pivotally attached to a stalk, not shown, of the boom of a hydraulic excavator, for example. Quick-change attachment component 10 pivots in the familiar manner via a swiveling link plate, also not shown, about a pivot axis perpendicular to the longitudinal axis. Quick-change attachment component 10 has a bore hole 12 to accommodate a tool-connecting pin, not shown here. In addition, quick-change attachment component 10 has a bearing 14 in which another pin of the tool, not shown, is retained by positive fit or frictional engagement.

According to the invention, a bushing 16 is inserted in bearing 14, bushing 16 being composed of a material which is more wear-resistant than the material of quick-change attachment component 10. Bushing 16 is fixed within a bushing support region of bearing 14, whereby this attachment may be implemented by an adhesive-bonding joint, shrink joint, welded joint, and/or screw connection, not shown in the figure. An essential aspect of the design of bushing 16 is the fact that it is formed by a half-liner having a large support angle α . This design ensures that the bushing is securely seated within the bushing support region.

Figure 2 shows an especially advantageous embodiment of bushing 16. Here a collar 18 is integrally formed as part of the edge region of bushing 16. The bushing support region here is created within quick-change attachment component 10 by a suitable bore hole in which the diameter of the bushing, and also of the collar, are recessed in a form-conforming manner. The bushing along with the collar in the edge region results in an increased strength and inherent stability which specifically provide improved strength in response to edge pressures.

Figures 3a and 3b illustrate bushing designs in which bushings 16 are composed of half-liners fabricated from curved flat steel such that their free ends 20, 22 contact shoulders 24 and 26 formed within the bushing support region of bearing 14.

The difference between the design variants of Figures 3a and 3b consists in the fact that Figure 3b shows a symmetrical half-liner, whereas in Figure 3a the ends of the half-liner are extended by an amount L.

By employing the bushing according to the invention, the intervals required to regenerate the quick-change attachment, as well as costs thus incurred, may both be significantly reduced.